

1986. This cooperative effort with nine other public health agencies investigated a variety of risk factors for important diseases, inquired about the health care needs and services received during the last year of life, and examined socioeconomic differentials in mortality.

Results from the 1986 National Mortality Followback Survey are available in a public use data tape with detailed technical documentation that can be purchased from NCHS. The data include items from the death certificates and the survey responses. A wealth of mortality issues can be analyzed using these data, and NCHS invites inquiries regarding potential studies and analyses.

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## Factors Influencing Intentions of Pregnant Women to Exercise After Giving Birth

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## Synopsis.....

*The aim of this study was to identify factors that may influence a pregnant woman's decision to exercise after giving birth. A sample of 98 pregnant women were asked to complete a questionnaire*

*investigating attitudes, social norms, perceived barriers to exercise, and intention regarding exercising after giving birth. Also determined were age, education level, exercise habits, number of months elapsed since onset of present pregnancy, and number of children.*

*The regressions of intentions to exercise on all variables yielded  $R^2$  of 0.52 for nulliparous and 0.60 for pluriparous pregnant women. Important differences in variables that explained intentions were found between both groups of women, with perceived barriers to exercise being a key predictor that was, in turn, influenced by previous experience with pregnancy.*

*It is suggested that the experience of the postnatal period modifies the interrelation between the variables explaining intentions regarding exercise after giving birth. Consequently, the programs should take into account the impact that the birth of a first child will have on the perceived barriers to exercise.*

**P**REGNANCY PROMPTS many women to modify their habits regarding the consumption of alcohol, the smoking of cigarettes, and the maintenance of exercise patterns. Often, however, these changes are temporary and, following delivery, old habits may be re-established. Thus, after delivery many women resume drinking and smoking. The situation with regard to exercise is more complex because the daily routines have to be reorganized postnatally to accommodate the arrival of a newborn. Therefore, it is difficult to predict that those women who were exercising before the onset of pregnancy will resume exercising after giving birth.

Pregnancy is an appropriate time for intervention because mothers-to-be are receptive to advice concerning their health habits. Therefore, health education programs offered to pregnant women should focus not only on factors determining behavior during pregnancy but also on those factors influencing the same behavior when their pattern of health habits will be adjusted to new living conditions.

One way to increase our understanding of the behavioral choices made by individuals is to investigate which factors define their behavioral intentions. Fishbein and Ajzen (1) have proposed a model in which intention (*I*) to perform a given behavior is a joint function of attitude toward their behavior (*Aact*) and the subjective social norm (*SN*) that governs the situation. A stepwise multiple regression technique determines the relative contribution of the two components; these contributions are indicated as standardized regression weights ( $w_1$  and  $w_2$ ). The weights are expected to vary with changes in behavior, situation, and actor. The theory is expressed algebraically as the multiple regression equation:

$$I = (Aact)w_1 + (SN)w_2$$

Although in some studies intention has been found not the sole predictor of behavior (for example, habit is considered to be another variable adding to the prediction of behavior (2-4)), a wealth of data supports intention as a major contributor to the prediction of health related behaviors (2,3, 5-8), including involvement in free-time exercise (4,9,10). The model has also been applied successfully to a population of pregnant women (3,6,11). Moreover, it appears that intention can be modified (12-16), thus providing an additional reason for studying its defining variables. Indeed, such information can be used as a

basis for the development of more effective educational programs.

Given this perspective, this study was planned in order to comprehend the intentions of pregnant women regarding exercising after giving birth. The basic framework for this study was the Fishbein and Ajzen (1) two-components model with the consideration of three additional variables. The first, habit, was added in light of the results obtained in previous research (2-4) which showed the contribution of habit to the understanding of intentions to exercise among different populations (4-7). The second variable, role belief, was borrowed from the Triandis model (18). This specific variable was chosen as an alternative to the social norm concept of Fishbein and Ajzen (1), a concept that was found in previous research to be unrelated to the intention to exercise during free time (4, 10, 17) or inappropriately defined (19, 20).

The third and final variable, perceived barrier, is also borrowed from the Triandis theory (18). This variable emerges as an evaluation of the prevailing environmental conditions that facilitate or hinder the performance of the behavior. Although Triandis did not consider perceived barriers as a variable explaining intentions (20), Ajzen (21) has proposed a new perspective of the Fishbein and Ajzen (1) model in which "perceived barrier" is evaluated as a concept similar to the "perceived self-efficacy" component of the Bandura theory of self-efficacy (22) and, as such, an indirect measure of the individual's perceived control over the performance of a given behavior (23). A recent publication by Ajzen and Madden (23) has shown that this new concept contributes to the understanding of intentions. In sum, in light of this theoretical framework, it was hoped that this study would provide some direction for the development of physical activity programs that are more effective and suitable to the needs of women during pregnancy.

## Method

**Subjects and procedures for data collection.** The sample was obtained from a population of pregnant women attending prenatal education classes offered by the Local Center for Community Services (CLSC), a division of the Ministry of Health of Social Services, Government of the Province of Québec. It has been documented (24) that the pregnant women who attend these courses are better educated, have a higher family income, and

Table 1. Mean and standard deviation of each variable

Variables	All subjects (N = 98)		Nullipara (N = 56)		Pluripara (N = 42)	
	Mean	± SD	Mean	± SD	Mean	± SD
Intention.....	7.2	2.3	7.3	2.0	7.0	2.8
Attitude.....	37.0	3.0	37.0	3.2	37.0	2.8
Subjective social norm.....	6.0	0.9	6.0	0.9	6.0	1.0
Role belief.....	5.6	1.0	5.6	1.0	5.6	0.9
Perceived barriers.....	3.2	1.3	2.8	0.9	<sup>1</sup> 3.7	1.5
Habit.....	2.5	0.7	2.5	0.7	2.4	0.8
Age (years).....	28.6	3.9	27.4	3.8	<sup>2</sup> 30.1	3.4
Education (years).....	14.9	2.7	15.1	3.0	14.5	2.2
Month of pregnancy.....	6.6	1.7	6.6	1.5	6.5	1.9

<sup>1</sup>  $P < 0.001$ . <sup>2</sup>  $P < 0.0001$ . NOTE: SD = standard deviation.

have better eating habits than pregnant women not registered for these courses.

The subjects contacted were 105 pregnant women registered at these prenatal education classes offered in three different CLSC in the Québec City metropolitan area. These CLSC were chosen for accessibility and convenience. An initial contact was established with the person in charge of the classes in each CLSC, and permission was obtained to meet with each group of prenatal education classes. No CLSC staff refused permission, and all agreed that those attending could be met during their regular class session. The study and its aims were explained, and all pregnant women were invited to participate by completing a 15-minute questionnaire. Only one woman refused to complete the questionnaire, and six questionnaires were incomplete and were subsequently eliminated from the final analysis.

**Variables measured.** The subject's attributes were measured following the methodology suggested by Fishbein and Ajzen (1) and Triandis (18).

**Behavioral intention (I).** The behavioral intention was measured by answers to the question: "Actually, what is the probability out of 100 that you will participate regularly in one or more physical activities during your free time after giving birth?. The responses were recorded on a 1 to 10 scale represented by a sequence of percentages ranging from 0 to 10, 11 to 20 and so forth until 91 to 100.

**Attitude-towards-the-act (Aact).** The subjects reported their attitude towards the behavior on six semantic differential scales ranging from 7 to 1. The bipolar adjectives were pleasant-unpleasant, interesting-dull, stimulating-boring, healthy-unhealthy, good-bad, and useful-useless. Each of the six scales appeared following the statement:

"For you, to participate regularly in one or more physical activities during your free time after giving birth would be . . .". Internal consistency was verified using the Cronbach alpha coefficient; an appropriate value of 0.82 was found.

**Subjective social norm (SN).** With reference to people they consider most important to them, the women were asked to answer the following question: "How strongly do you believe they think you should participate regularly in one or more physical activities during your free time after giving birth?". This item was measured on a 7-point semantic differential scale with likely (7) and unlikely (1) at the opposite ends.

**Role belief (RB).** The subjects were asked about other pregnant women. The measured item was preceded by the statement: "How strongly do you believe that other pregnant women think it is appropriate to participate regularly in one or more physical activities after giving birth?" This variable was measured on a 7-point semantic differential scale with opposite ends of likely (7) and unlikely (1).

**Perceived barrier (PB).** The subjects were told about several constraints to a lifestyle of regular physical activity (equipment, day-nursery, and so forth). They were then asked: "Following an evaluation of your personal situation, how strongly do you believe that to participate in one or more physical activities during your free time after giving birth will be easy or difficult for you?" The subjects recorded their response on a 7-point scale with opposite ends of difficult (7) and easy (1).

**Habit (H).** The subjects were asked, "How often did you participate in one or more physical activities during your free time during the past 12

Table 2. Zero-order correlations between the variables for 98 pregnant women

Variables	1	2	3	4	5	6	7	8	9	10
1. Intention.....	...									
2. Attitude.....	<sup>1</sup> 0.50	...								
3. Subjective social norm.....	-0.01	0.15	...							
4. Age.....	-0.14	0.03	-0.12	...						
5. Education.....	-0.03	0.12	0.06	0.21	...					
6. Month of pregnancy.....	-0.02	0.01	-0.10	0.06	0.30	...				
7. Habit.....	<sup>1</sup> 0.50	<sup>1</sup> 0.33	0.01	-0.12	-0.01	0.08	...			
8. Role belief.....	0.10	0.07	0.03	0.11	0.05	<sup>2</sup> 0.26	0.02	...		
9. Barriers.....	<sup>1</sup> -0.60	<sup>2</sup> 0.27	-0.14	<sup>3</sup> 0.19	0.08	0.07	<sup>1</sup> -0.39	-0.09	...	
10. Parity.....	-0.01	0.03	-0.16	<sup>1</sup> 0.43	-0.13	0.12	-0.10	-0.01	<sup>1</sup> 0.33	...

<sup>1</sup>  $P < 0.001$ . <sup>2</sup>  $P < 0.01$ . <sup>3</sup>  $P < 0.05$ .

months?'. The choices offered were never, occasionally, frequently, and always.

*Other personal variables.* All subjects were asked to indicate their age in years, total years of schooling, number of previous pregnancies if any (parity), and number of months elapsed since onset of present pregnancy.

*Statistical analysis.* According to Fishbein and Ajzen (1) the mathematical definition of their model, a stepwise multiple regression technique, was used. This procedure permits the determination of the relative weight of each variable significantly associated with intention by means of the standardized regression coefficients. Thus, three different analyses were developed to investigate the association between intention to exercise after giving birth and the other variables for (a) the whole group of pregnant women, (b) nulliparous pregnant women, and (c) pluriparous pregnant women.

## Results

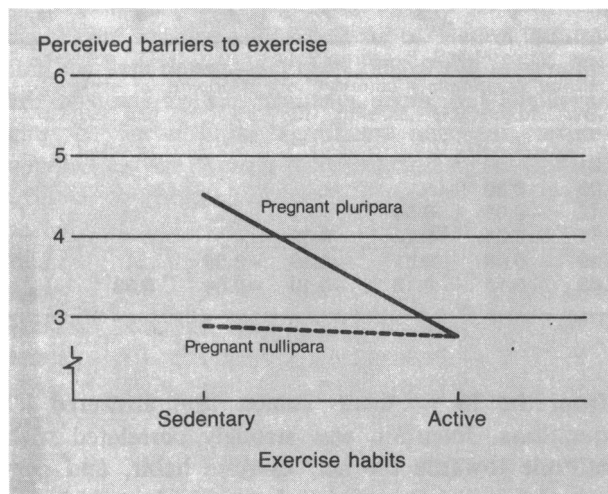
In our final sample of 98 pregnant women, 56 were nullipara (expecting a first child) and 42 were pluripara (expecting their second or third, or higher birth order child). For simplicity in this article these two groups of pregnant women are referred to as nullipara and pluripara. The means and standard deviations concerning each variable measured for the whole group of pregnant women and for both subgroups are presented in table 1. Note that the subgroups of pregnant women differed significantly with respect to age ( $F_{1,96} = 14.8$ ,  $P < 0.0001$ ), and perceived barrier ( $F_{1,96} = 12.7$ ,  $P < 0.001$ ).

Correlations between the variables are shown in table 2. These correlations are based on responses

from the 98 pregnant women who answered all questions. Intention was strongly correlated with attitude towards the act, exercise habit, and perceived barriers to exercise. Interestingly, role belief was significantly associated with the number of months elapsed since the onset of pregnancy. This correlation indicates that pregnant women increasingly identify themselves with other pregnant women as a significant reference group as they progress through their pregnancy. Two additional points of interest are that barriers to exercise are perceived as (a) easy to overcome for pregnant women who had the habit of exercising before their pregnancy and (b) difficult to overcome for pluripara. Thus, the influence of an exercise habit (sedentary-active) and group membership (nullipara-pluripara) on barriers to exercise was further investigated.

A  $2 \times 2$  analysis of variance, with age as a covariate, revealed that both variables (habit: sedentary-active and parity: nullipara-pluripara) had a significant main effect on perceived barriers to exercise (habit:  $F_{1,93} = 16.3$ ,  $P < 0.0001$ ; parity:  $F_{1,93} = 12.7$ ,  $P < 0.001$ ). Moreover, the interaction of habit parity was significant ( $F_{1,93} = 15.2$ ,  $P < 0.0001$ ), suggesting that the rating of perceived barriers is related to previous direct experience with the postnatal period. For active women, "perceived barrier" was stable for both nullipara ( $\bar{x} = 2.7$ ,  $N = 26$ ) and pluripara ( $\bar{x} = 2.7$ ;  $N = 21$ ). Among sedentary women, the rating of perceived barriers to exercise was higher for pluripara women ( $\bar{x} = 4.5$ ;  $N = 23$ ) compared with nullipara ( $\bar{x} = 2.9$ ;  $N = 28$ ). The difference is shown in the chart.

The regression of intentions to exercise of the nullipara group on all variables yielded a multiple correlation of 0.72, accounting for 52 percent of the variation in the intention to exercise (table 3). Attitude-towards-the-act, habit, and perceived bar-



riers to exercise contributed significantly to the prediction of intentions, the standardized regression coefficients for the three components being virtually equal.

Intentions of the pluripara were regressed on all variables. This process yielded a multiple correlation of 0.77, explaining 60 percent of the variation in the intentions to exercise. In order of decreasing importance, the three variables accounting for this variance were perceived barriers to exercise, attitudes-towards-the-act, and subjective social norm (table 4). The model just described revealed some interesting differences between the nullipara and pluripara. To test the significance of the differences in the regressions between the two groups, a further regression was performed; parity was entered into the regression equation predicting behavioral intentions, together with the interaction terms between parity and each variable. The results of this analysis are shown in table 5. The addition of parity contributed significantly to the amount of explained variation in intentions; however, none of the interaction terms were revealed to have significance. This finding indicates that variation in parity exerts an influence on behavioral intentions.

## Discussion

Over half the variance in intention to exercise has been explained for our group of pregnant women. With the exception of the variable attitude, there were interesting differences in the variables explaining intentions to exercise between pregnant nullipara and pluripara. Two variables were important: habit and perceived barriers.

The contribution of attitude-towards-the-act (*Act*) was significant for both nullipara and pluripara women, and for both it accounted for about a third of the explained variance. According to Fishbein and Ajzen (1) and Triandis (18), this observation confirms the importance of attitudes in understanding intentions. The role of attitude is also in agreement with previous observations by Riddle (11), Godin and coworkers (4), Godin and Shephard (17, 25), and Godin (26), who have shown that attitude towards an action is a significant variable in explaining intentions to exercise.

The role played by exercise habits in predicting nulliparas' intentions to exercise is also consistent with previous observations reported by Godin and coworkers (4, 17). This finding provides additional support for the view that other variables not considered as primary predictors of intentions in either the Fishbein or the Triandis models do have a direct effect on intentions. In other words, the effect of habit is not mediated through the original variables that are assumed to influence intention. The absence of habit as a significant predictor for exercise intentions of pluriparous women is particularly interesting and may be explained by the meaning derived from the wording of both the intention and the habit measures. In this study, considering the idiosyncrasies of nullipara and pluripara, it can be assumed that the intention measure (for example, after delivery) does not have the same meaning for both groups of women, since nullipara have never experienced the postnatal period. For the pluripara, intention has a significant meaning that is stored in their memory, whereas for nullipara the intention to exercise "after giving birth" is still an abstract concept. Thus, the habit variable has more correspondence to intention for nullipara than for pluripara. For pluripara the measure of habit would have corresponded to the measure of intention if the measure had referred to the habit of exercising "during their previous postnatal period."

The hypothesis advanced by Ajzen and Madden (23) that perceived barrier, as an indicator of perceived behavioral control, could add to the understanding of intentions was supported. It was also suggested that perceived behavioral control should exert more influence when the level of congruence between the perceived and the real barriers is high. This latter aspect could provide a plausible explanation for the difference between nullipara and pluripara in the importance given to perceived barriers to exercise. As demonstrated by Borgida and Campbell (27) and Fazio and Zanna

Table 3. Pregnant nullipara: stepwise multiple regression of intentions to exercise on predictor variables

Step	Variable entered	Unstandardized regression coefficient (B)	Standard error of (B)	Standardized regression coefficient (β)	Standard error of β	R <sup>2</sup> change	F of change	P
1.	Attitude.....	0.32	0.07	0.53	0.12	0.28	20.6	0.0001
2.	Attitude.....	0.26	0.07	0.43	0.11	0.13	11.6	0.005
	Barrier.....	-0.85	0.25	-0.37	0.11			
3.	Attitude.....	0.19	0.06	0.31	0.11	0.11	12.1	0.001
	Barrier.....	-0.81	0.23	-0.36	0.10			
	Habit.....	1.02	0.29	0.36	0.10			
4.	Role belief.....	0.81	0.20	0.10	0.11	0.01	0.26	0.93
5.	Age.....	-0.04	0.05	-0.07	0.11			
6.	Month of pregnancy.....	-0.01	0.01	-0.04	0.11			
7.	Subjective norm.....	-0.01	0.23	-0.01	0.11			
8.	Education.....	-0.02	0.07	-0.04	0.11			

NOTE: Overall R<sup>2</sup> = 0.52; F = 18.7; P < 0.0001.

Table 4. Pregnant pluripara: stepwise multiple regression of intentions to exercise on predictor variables

Step	Variable entered	Unstandardized regression coefficient (B)	Standard error of (B)	Standardized regression coefficient (β)	Standard error of β	R <sup>2</sup> change	F of change	P
1.	Barrier.....	-1.12	0.21	-0.69	0.11	0.48	37.2	0.0001
2.	Barrier.....	-1.10	0.21	-0.60	0.12	0.06	5.4	0.005
	Attitude.....	0.27	0.12	-0.27	0.12			
3.	Barrier.....	-1.24	0.21	-0.67	0.12	0.05	4.9	0.05
	Attitude.....	0.33	0.11	0.33	0.11			
	Subjective norm.....	-0.74	0.33	-0.25	0.11			
4.	Role belief.....	0.03	0.35	0.01	0.11	0.02	0.43	0.82
5.	Education.....	0.10	0.14	0.08	0.11			
6.	Age.....	-1.11	0.09	-0.14	0.12			
7.	Month of pregnancy.....	0.00	0.02	0.01	0.12			
8.	Habit.....	0.31	0.47	0.09	0.13			

NOTE: Overall R<sup>2</sup> = 0.60; F = 18.8; P < 0.0001.

Table 5. Pregnant nullipara and pluripara: stepwise multiple regression of intentions to exercise on predictor variables

Step	Variable entered	Unstandardized regression coefficient (B)	Standard error of (B)	Standardized regression coefficient (β)	Standard error of β	R <sup>2</sup> change	F of change	P
1.	Barrier .....	-1.11	0.15	-0.60	0.08	0.35	52.6	0.0001
2.	Barrier .....	-0.93	0.14	-0.50	0.08	0.12	21.1	0.0001
	Attitude.....	0.27	0.06	0.36	0.08			
3.	Barrier .....	-0.79	0.15	-0.42	0.08	0.04	8.7	0.005
	Attitude.....	0.23	0.06	0.30	0.08			
	Habit .....	0.75	0.26	0.24	0.08			
4.	Barrier .....	-0.92	0.15	-0.49	0.08	0.03	6.5	0.01
	Attitude.....	0.22	0.06	0.29	0.07			
	Habit .....	0.75	0.25	0.23	0.08			
	Parity .....	0.48	0.19	0.19	0.07			
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5.	Role belief.....	0.25	0.22	0.11	0.09	0.05	0.84	0.61
6.	Subjective norm.....	-0.24	0.21	-0.10	0.08			
7.	Education .....	-0.01	0.07	-0.01	0.09			
8.	Month of pregnancy .....	-0.01	0.01	-0.10	0.10			
9.	Age.....	-0.08	0.06	-0.14	0.09			
10-17.	Interaction terms between parity and each variable	...	...	...	...			

NOTE: Overall R<sup>2</sup> = 0.55; F = 28.2; P < 0.0001.

*'For the pluripara, intention has a significant meaning that is stored in their memory, whereas for nullipara, the intention to exercise "after giving birth" is still an abstract concept. Thus the habit variable has more correspondence to intention for nullipara than for pluripara.'*

(28) past experience with a given situation may have a significant effect on one's cognitive structure. Pluripara have experienced a postnatal period and are familiar with the difficulties they will have to overcome in order to exercise after delivery. In particular, sedentary pluripara perceive that the barriers to exercise are difficult for them to overcome. Unfortunately, the correlational nature of this study does not permit us to know if the "perception" of barriers is correct or not. In a future prospective study, it would be interesting to identify when sedentary pluripara develop this perception—before or as a result of the first experience in the postnatal period. If these pluripara were sedentary before the onset of their first pregnancy it could be concluded that this perception is either "true" or is a cognitive posteriori reason invoked to justify sedentarism. For these pregnant women the habit of being sedentary is established and would thus be very difficult to modify. However, if they became sedentary as the consequence of the first postnatal experience, as suggested by comparison with the overall rating of perceived barriers to exercise reported by nullipara, then it would be necessary to investigate why these women who had the habit of exercising did not return to this active lifestyle.

Two research avenues that might explain why these active women become sedentary are their capacity to reorganize their personal timetable and the quality of their social support network (29–31), especially the support received from the spouse (32, 33). This support aspect is highlighted by the negative contribution of the subjective social norm to the intention to exercise among pluripara and means that pregnant pluripara believe that "significant others" expect them not to exercise after childbirth, thus exerting a negative influence upon intention. Since our results suggest that pregnant women increasingly identify themselves with other pregnant women as they progress in their pregnancy, the importance of other pregnant women as

a potential group for social support should also be considered. Research on these aspects is recommended, since findings may be useful in designing intervention programs.

In contrast, active pluripara did not view the barriers to exercise as being so difficult to overcome. Therefore, for this subgroup of pregnant women there is a strong assumption that they will remain active after parturition, since they have already succeeded in maintaining the habit of exercising following a previous delivery.

In sum, special attention must be focused on perceived barriers to exercise among pregnant nullipara. For sedentary pregnant women, the progressing pregnancy will heighten the barrier against adopting an active lifestyle. However, considering that pregnancy for many mothers represents a period of receptivity concerning the adoption of new health habits, the development of health promotion programs aimed at (a) maximizing the support of the social network after delivery and (b) developing the capacity to reorganize their personal timetables is encouraged. This same approach is also recommended for pregnant active nullipara. That these women already have the habit of exercising is a positive factor, but it does not guarantee that the active lifestyle will be maintained. The arrival of the newborn will change many significant factors in the social network.

## Conclusion

The study suggests that the experience of a postnatal period modifies the composition of intentions to exercise. Pregnant pluripara seem more realistic in defining their intentions to exercise after delivery, attributing more importance to the barriers to exercise. It could be expected that the intention-behavior relation would be more consistent for pregnant pluripara than for nullipara. This observation, however, remains to be documented. The correlational nature of our study does not allow any firm causal influence; only an experimental study might answer this question. Nonetheless, within the limitations of this study, it is suggested that the experience of a postnatal period increases the importance of perceived barriers to exercise as a key variable defining intentions to exercise after giving birth.

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